HEALTH CONSULTATION

Mercury Exposure Incident at the

Silvio O. Conte Middle School

North Adams, Massachusetts

SEPTEMBER 30, 2009

Prepared by:

Massachusetts Department of Public Health
Bureau of Environmental Health
Environmental Toxicology Program
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry
Atlanta, Georgia

TABLE OF CONTENTS

SUMMARY 3
BACKGROUND 5
RESULTS OF URINARY MERCURY TESTING 8
DISCUSSION 8
CONCLUSIONS 9
RECOMMENDATIONS 10
PUBLIC HEALTH ACTION PLAN 10
REFERENCES 11
PREPARER 12
CERTIFICATION 13
FIGURES 14

SUMMARY

INTRODUCTION:

The Massachusetts Department of Public Health, Bureau of Environmental Health (MDPH/BEH), aims with this health consultation to provide the Silvio O. Conte Middle School community the best information possible on any public health concerns associated with a mercury spill at the school. On December 1, 2008, MDPH/BEH was notified by the North Adams Fire Department of a potential mercury spill involving students and staff at the Silvio O. Conte Middle School in the Town of North Adams. The MDPH/BEH Indoor Air Quality Program (IAQ) and Environmental Toxicology Program (ETP) responded. A vial of elemental mercury of undetermined quantity was spilled by a student at the school, resulting in the evacuation of more than 300 students, staff and visitors from the school. At the request of the North Adams Board of Health, MDPH/BEH IAQ staff were dispatched to the school to provide on-scene assistance.

The purpose of this health consultation is to evaluate the public health concerns for students, teachers, and others who may have come into contact with elemental mercury as a result of the release of mercury within the school. The presence of the spill in an area of the school with relatively heavy traffic (the main hallway) raised the potential for mercury to be transferred to secondary locations in the school from contact with shoes and other belongings.

In addition to on-scene assistance provided by MDPH/BEH IAQ, urine testing for mercury was offered to school students and staff who may have been exposed to mercury. Urine samples were collected by MDPH/BEH staff and analyzed by the MDPH William A. Hinton State Laboratory Institute (SLI). Environmental data and biomonitoring results were evaluated in this health consultation to determine if health effects were likely for those students, teachers, and others who may have been breathing mercury vapors in the indoor air of the school.

CONCLUSION:

MDPH concludes that breathing mercury vapor in the indoor air, following a mercury spill at the Silvio O. Conte Middle School is not expected to harm people's health.

BASIS FOR DECISION:	Risk-reduction measures, including monitoring of clothing and air, evacuation and clean up of the school, limited the duration of exposure to mercury vapors in the school. In addition urinary mercury analysis and results for those students and teachers in the vicinity of the mercury spill were below levels at which health effects would be expected.
NEXT STEPS:	- MDPH/BEH provided recommendations to the school administrators and local health agency with respect to avoidance of contaminated areas, possible health effects and clinical testing, and interpretation of air analyses and urine testing results. - Air testing was conducted at the conclusion of clean up and the Silvio O. Conte Middle School reopened on December 8, 2008. - The North Adams officials implemented all recommended actions and policy changes following the incident. At this time, no further actions are necessary to protect the population involved.
FOR MORE INFORMATION:	If you have concerns about your health, you should contact your health care provider. You may also call MDPH at 617-624-5757 and ask for information on mercury exposure.

BACKGROUND

On December 1, 2008, the North Adams Fire Department and the Massachusetts Department of Fire Services Hazardous Materials Team (Hazmat Team) responded at approximately 10:00 AM to a report of a mercury spill in the Silvio O. Conte Middle School, which includes a student population of more than 300 students, grades 6-8. Reportedly a vial containing an unknown quantity of mercury was spilled in a section of the first floor corridor near the north stairwell of the school (see Figure 1) by a Silvio O. Conte Middle School student. Officials reported that a school nurse recognized the material as mercury; students were then evacuated to a nearby church.

At approximately 11:00 AM the MDPH/BEH received a call about the incident from the North Adams health agent, who requested on-scene assistance. In response, MDPH/BEH immediately dispatched Indoor Air Quality (IAQ) program staff from the MDPH Western Regional Office in Northampton as well as from the MDPH Boston headquarters, to assist with the response.

The school was closed at approximately 11:00 AM and students who had been evacuated to a nearby church were transported on buses to their homes. In the meantime, review of film from closed circuit cameras operating in the area during the time mercury was present resulted in the identification of approximately 30 individuals who were likely exposed to mercury while walking/conversing in the hallway. These individuals or their parents were contacted to return to the school to have clothing and shoes measured for mercury contamination by the HazMat Team.

A total of 60 persons, including responders and other concerned students or school staff, were screened. Clothes/shoes found to be contaminated with mercury were disposed of as hazardous waste.

The HazMat Team also conducted the initial clean up around the spill, and conducted initial air testing for mercury in the building. All mercury air testing in the course of the response was done either by the HazMat Team, the Massachusetts Department of Environmental Protection (DEP), or the hazardous materials cleanup contractors. A Lumex meter was used to take

mercury measurements generally at floor level, in the vicinity of the breathing zone, or on surface areas (e.g. desks, laptops, lockers) (CJW 2009).

Lumex meter readings for the first and second floors ranged from less than 0.3 $\mu g/m^3$ to above 1 $\mu g/m^3$ (see Figures 1 and 2). Highest levels on the first floor were found in the art room (directly adjacent to the main spill area and determined by investigation to be a location of small amounts of mercury spillage), a portion of the stairwell adjacent to the nurse's office, and portions of the northern hallway. Highest levels on the second floor were found in the northern stairwell, northern hallway, and room 231. All Lumex meter readings recorded in the basement and third floor of the school were below 0.3 $\mu g/m^3$.

Mercury levels found in the art room were as high as 17.37 $\mu g/m^3$ near the floor and as high as 13.1 $\mu g/m^3$ near the surface of a desk. Mercury levels as high as 80.4 $\mu g/m^3$ and 66.2 $\mu g/m^3$ were recorded from certain pieces of clothing and shoes from students. Levels as high as 27.3 $\mu g/m^3$ were recorded from a bag of articles collected from the art room (CJW 2009).

DEP also carried out screening at the home of one student whose clothes registered over 80 $\mu g/m^3$; however, screening of the home did not show levels of mercury above 0.3 $\mu g/m^3$. Testing at the home of the student who spilled the mercury revealed air levels ranging from 20-60 $\mu g/m^3$. The student involved received medical attention, and the student's home was condemned by the North Adams Board of Health due to high mercury levels.

ATSDR has a chronic (at least one year of exposure) guideline of 0.3 $\mu g/m^3$ for elemental mercury. ATSDR does not have a guideline value for short-term air exposure to elemental mercury, which would be more appropriate in this situation. The US Environmental Protection Agency has proposed Acute Exposure Guideline Levels (AEGL) for elemental mercury. Proposed AEGLs that may result in serious health effects (e.g., neurological effects) in the general population, including sensitive individuals, range from 330 $\mu g/m^3$ (8 hour exposure) to 3,100 $\mu g/m^3$ (10 minute exposure). EPA was unable (due to data gaps) to develop AEGL guidance values for exposures ranging from 10 minutes to 8 hours for which no health effects would be expected for the general population. Thus, although the measured levels at the school

would be unlikely to have resulted in serious health effects, as defined by the EPA AEGL, it was well above chronic exposure guidelines (0.3 μg/m^3) and could have presented health concerns if sufficient exposures had occurred.

A DEP certified licensed site professional supervised the clean up of the school. BEH/IAQ made recommendations to the North Adams Fire Department concerning positioning of the ventilation equipment with respect to the spill area.

As part of the response, and because of elevated air mercury concentrations that could have presented health concerns given sufficient exposure opportunities, MDPH/BEH offered urinary mercury testing to all the individuals that were identified as being in the area of the spill or where mercury levels were detected during the initial response. Local health officials contacted the affected individuals during the afternoon and evening of the incident to offer the testing, and arranged for a location for participants to come the next morning (December 2) to provide a urine sample (at the BOH office). MDPH/BEH Environmental Toxicology Staff coordinated with the MDPH William A. Hinton State Laboratory Institute (SLI) to pick up urine sample kits and transport the kits to North Adams the following morning. In addition, copies of informed consent forms were made and taken for participants to sign, a requirement in order to participate in the urinary testing effort.

Twenty one urine samples were collected on December 2nd between noon and 3:30 PM and placed in a cooler with ice packs. Chain of Custody documentation was maintained for all samples, which were then transported to the MDPH SLI in Jamaica Plain, MA. A second collection of seven additional samples was carried out on December 3, 2008, at the North Adams Regional Hospital, and at the North Adams City Hall, following the same procedures as previously described and delivered to SLI. Urine mercury analysis was performed by the MDPH SLI Environmental Chemistry Laboratory using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The reporting limit for these analyses was 12 μg/L, or 12 parts per billion (ppb). The final urinary mercury levels were reported as (1) total mercury in urine (micrograms of mercury per liter of urine, μg/L) and also (2) mercury concentration in urine adjusted for creatinine (micrograms of mercury per gram of creatinine, μg/g). It is a common laboratory method to

adjust for creatinine content as this adjustment corrects for variable dilutions among spot urine samples (Barr et al., 2005).

RESULTS OF URINARY MERCURY TESTING

A total of 28 urine samples were analyzed, of which 27 showed no detectable mercury (detection limit of 12 μg/L). One sample result showed a level of 16.5 μg/L, however this individual had reported mercury exposure unrelated to the school building. A review of scientific literature indicates no clinical or subclinical effects have been reported for urine mercury levels below 20 μg/L (ATSDR 1992, 1999).

DISCUSSION

Urinary mercury analysis is reliable and simple, and provides rapid identification of individuals with elevated mercury levels (ATSDR 1992, 1999). The individuals tested represented those with the greatest opportunity for exposure (based on review of closed circuit camera) and based on these urinary mercury results, health effects would not be expected as a result of the mercury spill at the Silvio O. Conte Middle School. The fact that no one tested for urinary mercury had detectable mercury in their urine indicated they had minimal or no exposure to the airborne mercury (the one individual with urinary mercury detection had exposure unrelated to the school building). Students were reported to have been evacuated from the building within a half hour of the spill and contaminated clothes/shoes were disposed of as hazardous waste. Prompt evacuation of students at the school significantly limited the duration of exposure.

Letters were sent to all individuals who submitted urine samples (to parents or guardians for students) including the results of the analysis and an interpretation of the level.

Air testing was conducted at the conclusion of clean up operations to ensure that mercury levels in the school were below the ATSDR acceptable level for occupancy of any structure after a spill (1 $\mu g/m^3$) and the Silvio O. Conte Middle School reopened on December 8, 2008.

CONCLUSIONS

ATSDR requires that overarching conclusion category statements be used to summarize the findings of a public health assessment. ATSDR conclusion category statements are selected from site-specific conditions such as the degree of public health hazard based on the presence and duration of human exposure, contaminant concentration, the nature of toxic effects associated with site-related contaminants, presence of physical hazards, and community health concerns. Therefore, based on MDPH's evaluation of the available environmental and biomonitoring data, the following conclusions were made at the time of the notification and in the days that followed:

The incident at the North Adams Silvio O. Conte Middle School was a mercury release resulting in contamination with the potential for widespread cross-contamination and exposure to a vulnerable population. These factors and the combination of an unknown quantity of mercury, and an indeterminate time frame for exposure, put the school population and others with potential secondary exposures, at risk for health effects associated with inhalation of mercury vapors. However, the rapid analysis of the indoor environment and risk-reduction measures including evacuation and clean up, limited significant exposure.

Based on the data collected in the course of this investigation, ATSDR would conclude that breathing mercury vapor in the indoor air at the Silvio O. Conte Middle School during the incident described is not expected to harm people's health. The reason for this conclusion is that risk-reduction measures, including evacuation and clean up, limited the duration of exposure to mercury vapors in the school. In addition, mercury urinalysis results for those students and teachers in the vicinity of the mercury spill (and hence with the greatest opportunities for exposure) showed no detectable levels of mercury. The one individual with a detectable mercury level had mercury exposures unrelated to the incident at the school that likely explained the mercury detection in the urine. Importantly this individual had a mercury level below which clinical or subclinical effects have been reported. Thus, students and teachers in the vicinity of the mercury spill were likely exposed to mercury vapors, but not at sufficiently high

concentrations or for durations expected to harm people's health as demonstrated by urine mercury results.

RECOMMENDATIONS

MDPH/BEH provided recommendations to the school administrators and local health agency with respect to avoidance of contaminated areas, possible health effects and clinical testing, and interpretation of air analyses and urine testing results. MDPH/BEH programs provide ongoing assistance to schools, and to programs and individuals serving children, with respect to exposures to mercury and other hazardous materials.

Individuals with additional information or questions regarding this health consultation should contact the Bureau of Environmental Health, MDPH, Environmental Toxicology Program, at (617) 624-5757.

PUBLIC HEALTH ACTION PLAN

The North Adams officials implemented all recommended actions and policy changes following the incident. At this time, no further actions are necessary to protect the population involved. The school or North Adams Board of Health will continue to provide assistance or secure additional resources as necessary to support the recovery phase of this response.

REFERENCES

Agency for Toxic Substances and Disease Registry). 1999. Toxicological Profile for Mercury. Atlanta, GA: U.S. Department of Health and Human Services.

Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Suggested Action Levels for Indoor Mercury Vapors in Homes or Businesses with Indoor Gas Regulators.

Agency for Toxic Substances and Disease Registry (ATSDR). 1992. Case Studies in Environmental Health for Mercury. Atlanta, GA: U.S. Department of Health and Human Services.

Barr, Dana B., Wilder, Lynn C., Caudill, Samuel P., Gonzalez, Amanda J., Needham, Lance L., Pirkle, James L. 2005. Urinary Creatinine Concentrations in the U.S. Population: Implications for Urinary Biologic Monitoring Measurements. *Environmental Health Perspectives,* Vol. 113 (2), pgs. 192-200.

Cushing, Jamallo and Wheeler, Inc. (CJW) "Response Actions Associated with the Release of Elemental Mercury, Silvio O. Conte Middle School, North Adams, MA." Report on Conte Middle School. January 29, 2009.

OccuHealth, Inc., Mansfield, MA. "Airborne Mercury Testing Silvio O. Conte Middle School, North Adams, MA". Prepared for Cushing, Jammallo & Wheeler, Clinton, MA. December 11, 2008

Massachusetts Department of Environmental Protection, Bureau of Waste Site Clean Up, BWSC101, Release Tracking Number 1-17239.

U.S. Department of Labor Occupational Safety & Health Administration. NIOSH/OSHA/DOE Health Guidelines for Mercury Vapor. Web page accessed February 2008. http://www.osha.gov/SLTC/healthguidelines/mercuryvapor/index.html

PREPARER

This document was prepared by the Bureau of Environmental Health of the Massachusetts Department of Public Health. If you have any questions about this document, please contact Suzanne K. Condon, Director of BEH/MDPH at 250 Washington Street, 7th Floor, Boston, MA 02108.

CERTIFICATION

The Health Consultation, *Mercury Exposure Incident, Silvio O. Conte Middle School North Adams, Massachusetts,* was prepared by the Massachusetts Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the Health Consultation was initiated. Editorial review was completed by the cooperative agreement partner.

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Technical Project Officer, CAT, SPAB, DHAC, ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this Health Consultation and concurs with its findings.

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Team Lead, CAT, SPAB, DHAC

FIGURE 1
Silvio O. Conte Middle School
First Floor Plan

Base map (not to scale)

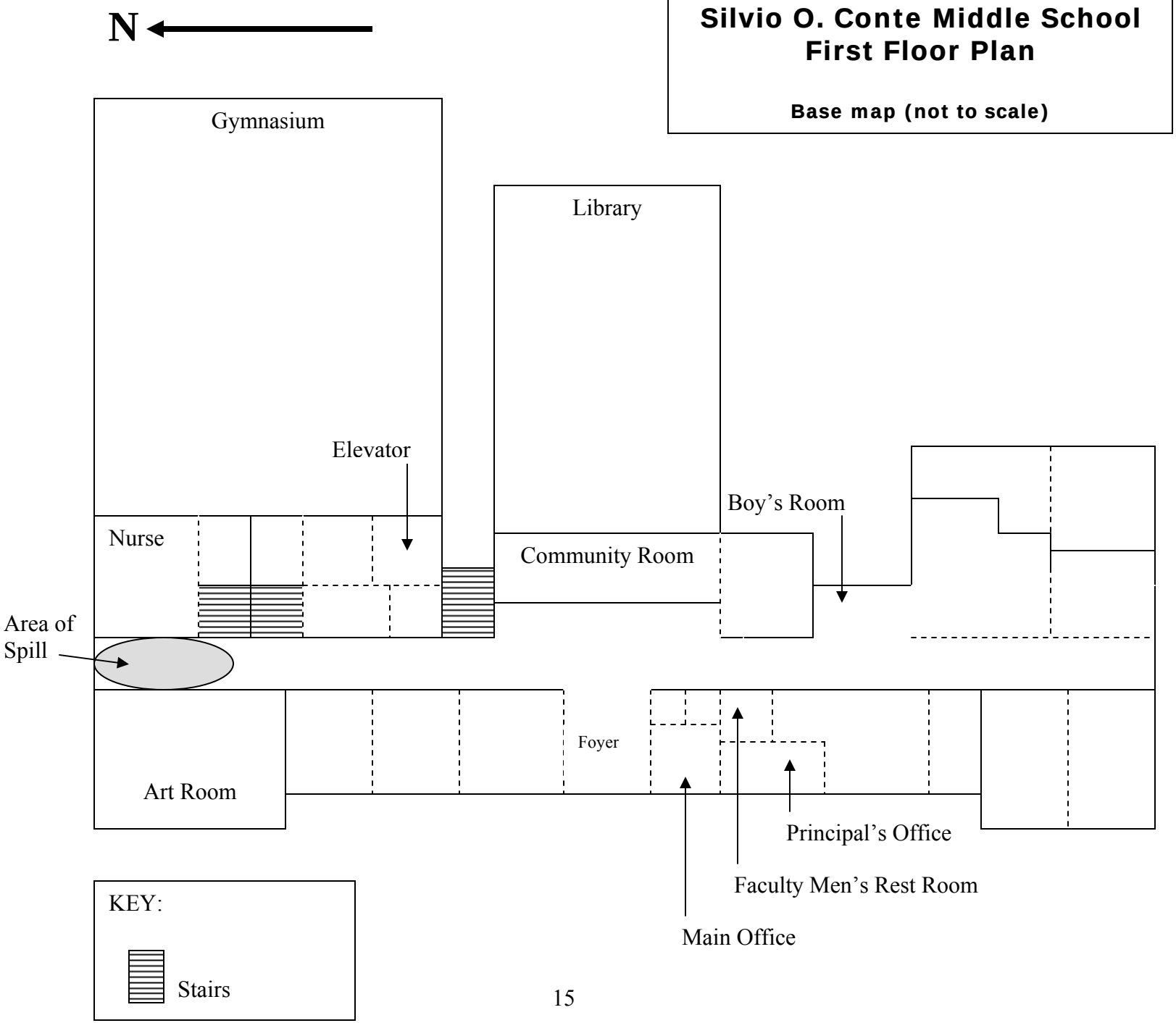

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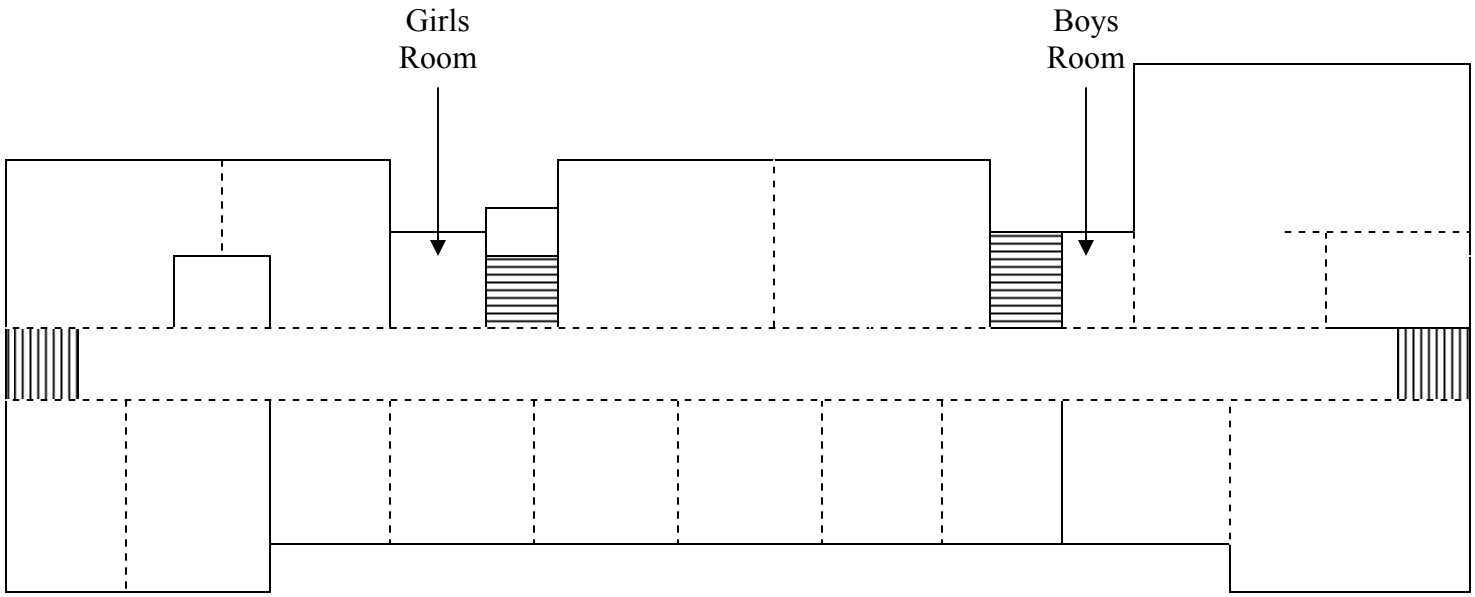
FIGURE 2
Silvio O. Conte Middle School
Second Floor Plan

Base map (not to scale)



KEY:

Stairs